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RunAs Radio is a weekly Internet Audio Talk Show for IT Professionals working with Microsoft products. The full range of IT topics is covered from a Microsoft-centric viewpoint.



Greg  
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**Jeff Woolsey Talks About Hyper-V and Beyond!**  
**December 10, 2008**





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**Brandon Wenn:** From [runasradio.com](http://runasradio.com), you're listening to RunAs Radio, the Internet audio talk show for IT professionals with Richard Campbell and Greg Hughes. This is Brandon Wenn, announcing show #87, with guest Jeff Woolsey, recorded Friday, November 7, 2008. RunAs Radio is produced each week by PWOP Productions, providing professional media and podcasting services online at [pwop.com](http://pwop.com).

**Richard Campbell:** This is Richard Campbell. You're listening to RunAs Radio and I'm here as always my co-host, Greg Hughes.

**Greg Hughes:** Hey Richard, we're at TechEd having a good day.

**Richard Campbell:** Oh yeah, the show is starting to wind up, certainly still buzzing away. We've finished off Speaker Idol which was great. Rhonda Layfield won again.

**Greg Hughes:** Yeah, she won in the United States as well. She's a terrific presenter. I mean you really got to hand it to her, she does a terrific job.

**Richard Campbell:** Yeah, she still has never spoken at TechEd so she was eligible to participate in Speaker Idol and sure enough she participated and did really, really well, just knocked it out of the park.

**Greg Hughes:** Yeah and really everyone who participated was just great. It was a really good line up all the way around.

**Richard Campbell:** And the finalists were astounding. I think all of those finalists should be speaking at TechEd next year.

**Greg Hughes:** Yeah, I agree. So we're here with a guest.

**Richard Campbell:** Yes indeed, we're here with Jeff Woolsey and he has been living and breathing virtualization for how long?

**Jeff Woolsey:** For over 10 years now.

**Richard Campbell:** Wow. You know most of us – I mean, virtualization has been around for a long time, it is mainframe technology.

**Jeff Woolsey:** Yeah, it's actually a technology that has been around for almost three decades right now. I've had the pleasure of working on virtualization and virtual PC for Mac, virtual PC for Windows, virtual server, virtual server R2, now the new Hyper-V technology and Windows Server 2008 as well as our

standalone free Microsoft Hyper-V server. So a lot of virtualization technology and it's all here.

**Richard Campbell:** I first bumped into virtualization in, I guess, the late '90s as really a test platform technique so it was easier to run and have multiple OS's and be able to check the performance of apps on different OS's. That evolved, it's amazing how now it's become the deployment strategy for most server solutions. What changed that that suddenly became the way?

**Jeff Woolsey:** You know, virtualization has really matured even as early as five years ago. You're right, it has been limited to test in dev environments. First of all, there was a leap of faith, there was some trust that folks had to have in virtualization.

**Richard Campbell:** Sure.

**Jeff Woolsey:** There was also the adaption of 64-bit, quite honestly, which Hyper-V is really huge. We're actually a 64-bit native technology and we take that full advantage of that because we need all of that kernel address space to provide support for running virtual machines.

**Richard Campbell:** 64-bit seems to just sort of released virtualization from its bonds...

**Jeff Woolsey:** Yes.

**Richard Campbell:** It took off after that

**Jeff Woolsey:** That was one part of it. Another part of it is, of course, the adaption of multi-core. Morse Law has been running rampant. It's been really great for us in virtualization world because think about how many decades we had processors with single thread of execution...

**Richard Campbell:** Sure.

**Jeff Woolsey:** And then we made the jump to processors with two cores, but not so long afterwards all of sudden we have processors with four cores and now even six cores on a processor and when you look at the types of workloads that can take advantage of that many cores, virtualization is one that can harness all of that power.

**Richard Campbell:** I really look at that as also we had a limit in terms of speed. You know, we started pushing the P4 which is close to 4-gigahertz and things start breaking down and now we've backed off, these multi-cores are now slower, they're two-and-a-half, maybe three, but we have many cores so we garnered this sort of massively parallel approach to things. Do you think virtualization's rise is better than



that? If we were actually staying on the old track and we were running 7, 8-gigahertz processors right now, would virtualization have done as well?

**Jeff Woolsey:** Well, you have to ask yourself would those with 7-gigahertz single threaded or would those be multithreaded...?

**Richard Campbell:** It's a single processor running.

**Jeff Woolsey:** I mean for us, for virtualization, we actually need more cores.

**Richard Campbell:** Right.

**Jeff Woolsey:** In addition, beyond just the addition of core counts, of course the instruction per clock has gotten much more efficient. AMD did a fantastic work with the Opteron, Intel did fantastic with the Core 2 architecture and now their new iCore 7 the Helium, they're definitely doing more to squeeze more work out of every clock cycle so even though we're not necessarily 4-gigahertz, we're getting so much more work done per clock...

**Richard Campbell:** Per cycle.

**Jeff Woolsey:** And then you add the multiple cores and we're just, you know, Hyper-V and virtualization has really been able to harness all of that capability.

**Richard Campbell:** And haven't the processor manufacturers also added now specific features for virtualization?

**Jeff Woolsey:** Yes and that was really yet another lynchpin that we needed to make virtualization successful. In the past, going back to Pentium 4s and in earlier processors, they didn't have some of the assists that we need in hardware to actually provide virtualization support. Going back a few decades, the x86 architecture is quite old and one of the things that originally it wasn't designed to do is virtualization. Of course no one expected that on your 286, 386.

**Richard Campbell:** Sure.

**Jeff Woolsey:** And as these processors have gotten more powerful and we have enabled virtualization. One of the things we wanted to do was to push some of these work down into the hardware so we wouldn't have to do as much software gymnastics just to enable virtualization because a lot of people don't realize that the initial x86 architecture wasn't designed with virtualization in mind and so we actually had to do a lot of extra work just to make it even possible to do virtualization. So Intel came out with their VT technology and AMD came out with their

Pacifica which they now call AMDV which allows us to push some of this kit tech into the hardware.

**Greg Hughes:** So having adopted virtualization fairly early on, certainly early in this decade and using it for enterprise and live use, not just for back-end type stuff or for testing, saw a lot of mistakes being made and a lot of glitches coming up and a lot of virtualization failure frankly. So what is the IT person who is doing day-to-day operations today who maybe has experienced that in the past and is concerned about going back and trying virtualization again, what would you tell them?

**Jeff Woolsey:** First of all, I would tell them, you know, one of our goals at Microsoft has been to give virtualization the high performance, hypervisor-based virtualization out to everyone. If you look quite honestly less than 10% of servers worldwide are virtualized. Everyone keeps telling me how virtualization is everywhere and I keep going, well, actually it's not, we're still getting started. Our goal, quite honestly, is to help jumpstart it. We want to see greater adaptation of virtualization so it's a role built into Server 2008, it's simply there, you enable it and you go, just like file print, web terminal services. It's just another role.

**Richard Campbell:** Yeah, once you install it of course because 2008 didn't ship with it initially.

**Jeff Woolsey:** Correct. It's simply there though and you can get running and creating virtual machines. The other thing we spend a lot of time on is ease of use so that just out of the box using Server 2008, Hyper-V, creating virtualization machines, get running, is very quickly. The other thing that has changed is the maturity of the management tools out there. One of the biggest problems early on with virtualization is, okay, so you get a set up on a single system and maybe that works, but what happens when you have a pool of servers and you need to manage a farm of resources...

**Greg Hughes:** Right.

**Jeff Woolsey:** And so we have things like Virtual Machine Manager 2008 which we just released which allows you to manage an entire pool of servers running Virtual Server, Hyper-V, or even VMware ESX offered as single console.

**Greg Hughes:** So the problem of the compliance and think about virtual machines gone wild, you know you have VHD files or whether it's a VM Ware or if it's Hyper-V or whatever virtualization methodology you've chosen or several that you've chosen to implement, not to mention the rogue ones that are just people within an organization building up VM's in order to get their work done, libraries or virtual



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machines and just the general management of it, how do I know how much software I need to buy and how do I know what I don't know? What do we have for answers for that today?

**Jeff Woolsey:** Right. Well, we've actually made a number of tools, in fact, available for free. We have a Solution Examiner, for example, that you can actually run in your infrastructure and it will actually help you do capacity planning for Hyper-V. So people look at virtualization and trial Hyper-V, they really get excited and go this is great, I want to get started, and then they started looking in their infrastructure and their first question is how do I know what I should virtualize and how can I help make that determination. Well, we actually have a Solution Examiner that will help you do Hyper-V capacity planning, you can download it for free, you run it internally, it's a standalone tool, doesn't have any dependencies or requirements and will sit there and it will analyze your internal infrastructure, they will look at your server and things like that and actually come back with a list of servers and give you recommendations as to what you can start virtualizing now or what you may want to leave on the hardware. For example, if you've got a physical server, it has some interesting, maybe not standard hardware, for example it's got a token ring card, probably there is some interesting dependency that you want to keep that on the hardware...

**Richard Campbell:** Right.

**Jeff Woolsey:** But if you don't have any funky looking hardware like that, it will probably virtualize pretty well.

**Richard Campbell:** There's a few interesting Best Practices around this that you can really dig into like as I've been virtualizing some systems, I'm realizing stuff like you to have one active directory that lives in the host machine and one active directory server just to get things going properly and maybe two if you want to be redundant. Even though AD lends itself so nicely to a lightweight server core VM, you need that sort of bare metal angle to it and I think there are other bare metal scenarios, certainly token ring card, exotic hardware, even when we got into high-end LANS and things because it's very tough to do that virtually. Are there any other areas where you think there is a machine that you'll say more or less bare?

**Jeff Woolsey:** You know, that number is rapidly decreasing.

**Richard Campbell:** Sure.

**Jeff Woolsey:** I will tell you at Microsoft we are using Hyper-V internally like crazy. In fact, in all of Microsoft's history, this last year for the first time

even, our server count actually went down. It's the first time ever.

**Richard Campbell:** Well, and you're still growing as you go.

**Jeff Woolsey:** Exactly, while we've been growing like mad because of Hyper-V usage. If you ask for a server now within Microsoft, you don't get a physical server. It's a Hyper-V system with virtual machines.

**Richard Campbell:** Where it runs is just not an issue, it doesn't matter.

**Jeff Woolsey:** Exactly and performance scalability, quite honestly, really have been -- you know, Hyper-V is doing fantastic. In fact, some of our largest internet websites are actually powered from Hyper-V. TechNet for example, very popular website, gets over million hits per day, is running completely on Hyper-V. [msdn.microsoft.com](http://msdn.microsoft.com), very popular website, over three million hits a day is running, again completely a hundred percent of Hyper-V and then in fact the big one, [microsoft.com](http://microsoft.com), we get over a billion hits per month. It's actually one of the largest websites on the planet, over 50% of that is running on Hyper-V right now. It's not 100% yet because they're actually using this opportunity to replace the hardware and upgrade some of the hardware at the same time.

**Richard Campbell:** Sure. It's interesting to think about that. When you're talking about obviously a big web farm, you think about [www.microsoft.com](http://www.microsoft.com). You are paying a penalty in overhead in the -- you are running nothing all virtualized but it's just the flexibility advantage to have that much more gear?

**Jeff Woolsey:** The flexibility is huge for those guys. Like I said they're actually changing out the hardware at the same time. For them, it's just copying out some VM's, bringing some new hardware with Server 2008 with the Hyper-V role enabled and all of a sudden they're going up, they're up in no time flat.

**Richard Campbell:** Are we in a place now where we could be dynamically allocating additional VM's to serve that farm as demand went up?

**Jeff Woolsey:** Oh definitely. You can have virtual machines participate for example in an NOB cluster which is exactly what they're doing for a number of these farms so they can add VM's, add servers, do it on demand especially for things like the holiday season where the demand goes up.

**Richard Campbell:** Sure. A major launch of any kind, I'm just thinking about when a service pack ships, you know, the impact on [msdn.microsoft.com](http://msdn.microsoft.com),



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suddenly that huge additional demand is lots and lots of more hits. So how quickly can we spin out more VM's and expand the size of that farm?

**Jeff Woolsey:** And that's exactly it. They can bring up capacity on demand very quickly and very easily because it's the flexibility of a VM.

**Greg Hughes:** How does this relate to the cloud computing initiative? You know the Azure and the new things that have been discussed.

**Jeff Woolsey:** So just to be clear, I work in the server division in Hyper-V. I don't work on the Azure team so I don't want to speak out of school here.

**Greg Hughes:** Sure.

**Jeff Woolsey:** But I will tell you that Azure provides complimentary services as well. We've already kind of hinted that virtualization is going to play a role in the Azure space in the longer term so I would wait, you know, wait and you're going to hear much more coming from both the Azure team and the Server teams.

**Richard Campbell:** Sure, this is all early days still, just starting to get the real scope of virtualization. I heard this incredible number in an interview I did early today that 50% of all servers being bought today are being bought by three companies: Yahoo, Google, and Microsoft. Just the scope of what it takes to manage that much gear, you know, you're not opening a lot of cardboard boxes anymore.

**Jeff Woolsey:** Exactly.

**Richard Campbell:** I ought to mention all new equipment now going in is essentially virtualized for everything and moving between machines without even thinking about it, it's just not a big deal.

**Jeff Woolsey:** And again you have to remember that these servers are buying a standard -- you know, an entry level server today is 2Proc Quad Core...

**Richard Campbell:** Yeah.

**Jeff Woolsey:** And again, it's a perfect platform to start virtualizing and take advantage of all those resources.

**Richard Campbell:** And so when you talk about sort of Best Practices you're using in Hyper-V, is it just a minimum like a pair of machines that are Dual Proc Quad core, 12 gigs of RAM? Does that sound right? Is that what we're looking at?

**Jeff Woolsey:** You know it really depends on what customers are looking, what their business requirements are...

**Richard Campbell:** Sure.

**Jeff Woolsey:** What I tell them overall, one of the most important tenants to remember when building a virtualization server, and you could say this pretty much for any server, but it becomes a little bit more important to virtualization server, is to build a balance system.

**Richard Campbell:** Right.

**Jeff Woolsey:** Don't buy a system with 2Proc Quad Core and stick 4 gigs of memory in there.

**Richard Campbell:** Yeah.

**Jeff Woolsey:** I mean, you're shooting yourself in the foot because you're going to end up paging a ton. Don't buy a system with 2Proc Quad Core, 16 gigs of memory in a single spindle. You got to think about the entire system. You want to make sure you mitigate any bottlenecks, even network adapters for example. If you have 20 physical machines and you virtualize on them a single server and you're running 20 VM's, you don't want them all fighting to go through a single gigabyte NIC on the system. So multiple network adapters, multiple spindles, multiple channels for IO as well as lots of memory to feed those, and I generally say it's a rule of thumb, 4 gigs of memory per core is going to give you plenty of memory so you can feed those cores.

**Richard Campbell:** And get at least a couple of spindles, I mean just the mass sort of works out...

**Jeff Woolsey:** Yes.

**Richard Campbell:** The network is an interesting part of that because suddenly our network density goes up so much with these vending machines where we were running four or six NICs on these machines and we got all this switching for very little computers.

**Jeff Woolsey:** Yes and there is a lot of flexibility out there. If you buy a rack server, you can buy dual quad core NICs. If you're investing in blades, the blade chassis' now have very flexible networking on the back that allows you to have multi ports per blade and things like that. So there is a tremendous amount of flexibility depending on what type of hardware you're using and of course how you use your virtualization in conjunction with that.

**Richard Campbell:** So I'm just thinking through your ratio here, that sounds like the dual quad core



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which has such a nice price point, needs about 32 gigs of RAM to keep that 4 gigs per core model.

**Jeff Woolsey:** And 32 gigs of RAM isn't actually that expensive anymore, it really isn't.

**Richard Campbell:** Not anymore, no. It really has trimmed down.

**Jeff Woolsey:** I priced out, I think it was 128 gigs from a major OEM and it was around \$10,000 or something like that. It used to be many times more than that.

**Richard Campbell:** Well, I mean that is 128 gigs. We cut that down to 32, it isn't a quarter of the price. It's like an eighth of the price.

**Jeff Woolsey:** Yeah.

**Richard Campbell:** As soon as we step off those high-end ships, prices drop fast.

**Jeff Woolsey:** Yes and one of the things we're seeing from the OEM's is, and we're very excited about this, is they've heard us. I mean, we've actually been telling them for years, guys, we need more DIMM sockets on the motherboards and if you look at the latest servers shipping from all the major manufacturers, you're seeing 16, 24 DIMM sockets, if not more, in many cases even on a one use server.

**Richard Campbell:** I'm seeing this now even on the workstation motherboards where we are now seeing 6 DIMMs in the workstation motherboards. It's an interesting thought about how much -- certainly Hyper-V makes perfect sense to the server and today we don't have a Hyper-V incarnation for the desktop machines. Is that coming? I mean, right now we use PPC.

**Jeff Woolsey:** We're certainly working on more on the client-side of things and you're going to see additional iterations going on on client...

**Richard Campbell:** Sure.

**Jeff Woolsey:** But right now, like I said I'm focused on the server-side so I don't want to speak out of school.

**Richard Campbell:** Not your problem at all.

**Jeff Woolsey:** It's not my problem, it's just that it's at the different side of the world and I don't want to talk out of school.

**Richard Campbell:** We did see at PDC, Windows 7.0 talked about being able to spin up a VPC on demand.

**Jeff Woolsey:** Yes.

**Richard Campbell:** No extra software.

**Jeff Woolsey:** Yes.

**Richard Campbell:** Like an ISO now. It's a very interesting way to think about that actually. Just like in ISO, a whole machine. It's a good thing.

**Jeff Woolsey:** Yes.

**Richard Campbell:** We're in a good place.

**Jeff Woolsey:** We are.

**Richard Campbell:** So I'm just wondering where we're going from here. We've had some discussions already about Windows 2008 R2 talking about the instant swap-overs of VM's between machines...

**Jeff Woolsey:** Like migration...

**Richard Campbell:** Like migration is going to be happening. Are there other key features that are on the radar?

**Jeff Woolsey:** Oh definitely. Here, at IT Forum, we've been talking about -- I've had a session yesterday that went deep into the capabilities of Hyper-V in Server 2008 R2 and in some of these you actually need some slides to explain how some of these capabilities work...

**Richard Campbell:** Sure.

**Jeff Woolsey:** But a few of them they point out, in addition to live migration, one of the key capabilities is working very closely with some of the network adapter vendors so we're going to be taking advantage of numerous network capabilities. For example, TCP/IP Offload. You may have heard of it, it's called Chimney at Microsoft. What this allows us to do is offload things to the offload actually in the physical NICs. This is especially important as we start to move to 10GE and you want that Oslo being held by the NIC...

**Richard Campbell:** That whole connection negotiation TCP/IP, I'm amazed how much overhead that actually invokes.

**Jeff Woolsey:** Oh yeah, especially 10GE, that's a lot of work to do.

**Richard Campbell:** Yeah, getting rid of some chatters, everything.



**Jeff Woolsey:** Yes and it's huge. So we'll have full advantage, we'll take advantage of TCP/IP Offload. Another capability is what we call VM queues, virtual machine queues, and essentially the network vendors have been adding these device queues to the physical NICs themselves and essentially think of it as a freeway with two lanes, now it's a freeway with 8 lanes or 16 lanes or 32 lanes.

**Richard Campbell:** Wow.

**Jeff Woolsey:** What this means is I can take network traffic from a queue running in a NIC and actually DMA it into the virtual machine itself and so what this does is actually it shortens the path and increases performance tremendously.

**Richard Campbell:** Just tightening up the distance between the physical NIC and the virtual machine.

**Jeff Woolsey:** Yes.

**Richard Campbell:** It's the same way that we have optimization in the processors to make virtual machines run better without getting oppositions on the network level.

**Jeff Woolsey:** Yes.

**Richard Campbell:** Are there other pinch points? I've always had a sense that virtual machines just lends themselves using iSCSI really well, but generally speaking it seems like this guy always a challenge for VM's as well.

**Jeff Woolsey:** You know, it house but I have to say we've been really, really happy with, honestly, the disk IO even in Server 2008, Hyper-V. We exceeded our expectations there and it was so good that we spent most of our time; I won't say all of it but a good portion of it, looking at networking in Server 2008 R2. I've actually had pretty much no complaints about IO performance for storage at Hyper-V...

**Richard Campbell:** Is there a particular tactic on the IO side that is the right ones for VM? Is it better to go the iSCSI route versus a direct attach storage? Are we better off with SCSI versus SAS? Does it matter?

**Jeff Woolsey:** One of our goals is currently to be as agnostic as possible...

**Richard Campbell:** Sure.

**Jeff Woolsey:** So we can support everything and give you performance no matter what your underlying storage is whether it's iSCSI, whether it's fiber channel, whether it's SAS, whether it's parallel SCSI, you name it, we support it. I mean, our goal

here is you present a storage whether it's a LUN or a VHD sitting on some storage, we'll take advantage of it.

**Richard Campbell:** And it will just work.

**Jeff Woolsey:** Yeah and this way we can meet any price point the customer is after whether it's on a branch office and they want to put it on a low-end iSCSI or if they're an enterprise and they want to put on really fast fiber channels.

**Richard Campbell:** Excellent. Jeff thanks so much for coming on the show. Any final call outs, places people should be looking for more information about Hyper-V?

**Jeff Woolsey:** The best place is to go to [www.microsoft.com/virtualization](http://www.microsoft.com/virtualization). We talk about not only Hyper-V, but all of our virtualization technologies like application virtualization or App V, as well as presentation virtualization to terminal services, as well as hosted desktop using Vista Enterprise Centralized Desktop so people can take advantage of hosted desktops with Hyper-V.

**Richard Campbell:** It's cool. Virtualization is a lot more than just Hyper-V these days.

**Jeff Woolsey:** Oh yes.

**Richard Campbell:** Thanks very much for coming on.

**Jeff Woolsey:** Thank you.

**Richard Campbell:** And we'll talk to you next time on RunAs Radio.